

Two Dimensional Pt/CuO-GO Nanocomposites through Thermal Treatment of Cyano-Bridged Coordination Polymers

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Recently, the controlled thermal decomposition of cyano-bridged coordination polymers has been reported. Various nanostructured metals and metals oxides (*e.g.*, Co₃O₄, NiO) with different morphologies can be prepared because of the transformation of metal ions into higher oxidation states and removal of the organic parts.^[1-3] The metal content remains to take part in the formation of frameworks of nanoporous metals oxides, while the removable organic components through calcination can provide nanoporosity.

Here we report a synthesis of two dimensional (2D) Pt/CuO-graphene oxide (GO) composites through thermal treatment of cyano-bridged coordination polymers. By insertion of 2D Cu-Pt coordination polymer nanoflakes between the GO layers, the original 2D structure can be retained even after the thermal treatment. Without the GO supports, the crystallization of the frameworks and thermal fusion of nanopores proceed, thereby resulting in a formation of bulk crystals with low surface area. Our obtained 2D Pt/CuO-GO nanocomposites show high electrocatalytic activity for the oxygen reduction reaction.

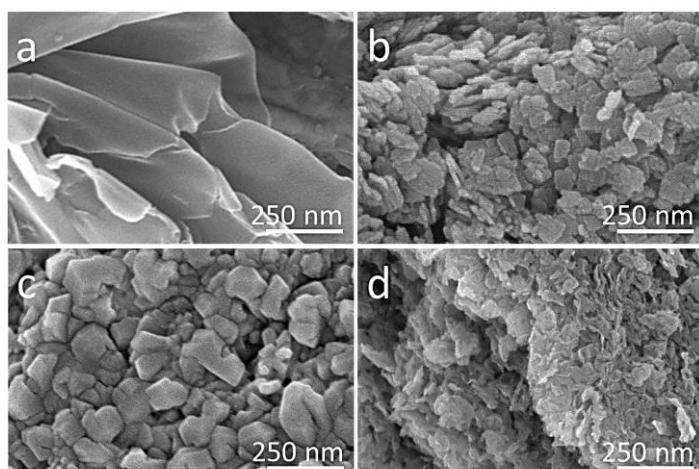


Figure 1 SEM images of a) GO sheets, b) CuPt nanoflakes, c) Pt/CuO nanocomposites, and d) Pt/CuO-GO nanocomposites.

Reference:

- [1] M. B. Zakaria, M. Hu, M. Imura, R. R. Salunkhe, N. Umezawa, H. Hamoudi, A. A. Belik, Y. Yamauchi, *Chem. Eur. J.*, **20**, 17375-17384 (2014)
- [2] M. B. Zakaria, M. Hu, M. Pramanik, C. Li, J. Tang, A. Aldalbahi, S. M. Alshehri, V. Malgras, Y. Yamauchi, *Chem. Asian J.*, **10**, 1541-1545 (2015).
- [3] M. B. Zakaria, M. Hu, R. R. Salunkhe, M. Pramanik, K. Takai, V. Malgras, S. Choi, S. X. Dou, J. H. Kim, M. Imura, S. Ishihara, Y. Yamauchi, *Chem. Eur. J.*, **21**, 3605-3612 (2015).